THE INSTITUTION
OF ELECTRICAL
ENGINEERS

IEE

IEE PROCEEDINGS-A
covering
Physical Science, Measurement and Instrumentation, Management and Education

Vol. 137, 1990

Published by
The IEE, Savoy Place, London WC2R 0BL, United Kingdom
Publishing Department: Michael Faraday House, Six Hills Way, Stevenage, Herts. SG1 2AY, United Kingdom

IEE Proceedings A
Physical Science · Measurement and Instrumentation · Management and Education · Reviews
The Institution of Electrical Engineers, Savoy Place, London WC2R 0BL, United Kingdom
Publishing Department: Michael Faraday House, Six Hills Way, Stevenage, Herts. SG1 2AY, United Kingdom

Volume 137 1990 UK ISSN 0143–702X

HONORARY EDITORS

General: Dr. G.W. Chantry (*Information Technology Transfer Consultant*)
Special issues: Prof. D.T. Swift-Hook (*Consultant*)
Education: Dr. B. Bolton (*University of Bath*)
Management: Mr. D.L. Johnston (*Management Consultant*)

Pages in issues of *IEE Proceedings Part A*, 1990

Pages	Issue No.	Date
1–72	1	January
73–124	2	March
125–160	3	May
161–232	4	July
233–312	5	September
313–384	6	November

This publication is copyright under the Berne Convention and the International Copyright Convention. All rights reserved. Apart from any copying under the UK Copyright, Designs and Patents Act 1988, Part 1, Section 38, whereby a single copy of this article may be supplied, under certain conditions, for the purposes of research or private study, by a library of a class prescribed by The Copyright (Librarians and Archivists) (Copying of Copyright Material) Regulations 1989: SI 1989/1212, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without the prior permission of the copyright owners. Permission is, however, not required to copy abstracts of papers or articles on condition that a full reference to the source is shown.

Authorisation to photocopy items for internal or personal use, or for the internal or personal use of specific clients, is granted by the Institution of Electrical Engineers for libraries and other users registered with the Copyright Clearance Center Transactional Reporting Service, provided that the base fee of $3.00 per copy is paid directly to the Copyright Clearance Center, Inc., 21 Congress Street, Salem, MA 01970, USA. 0143–702X/90 $3.00 + 0.00. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale.

Photocopies of individual papers published in the *IEE Proceedings* can be supplied from the IEE Library at 10p per page plus a handling charge.

The telephone number of the IEE London office is 071 240 1871; telex: 261176 IEELDN G; facsimile: 071 240 77 35.

The IEE is not as a body responsible for the opinions expressed by individual authors.
The IEE is a member of the Association of Learned & Professional Society Publishers.

© 1990: The Institution of Electrical Engineers

Secretary of the IEE: J.C. Williams, PhD, FEng, FIEE
Managing Editor: Bernard Dunkley
Graphics Manager: Maurice Partridge

Typeset by: Santype International Limited, Salisbury, Wiltshire, United Kingdom
Printed by: Unwin Brothers Limited, Old Woking, Surrey, United Kingdom

Index

IEE Proceedings A
covering
Physical Science, Measurement and Instrumentation, Management and Education

Vol. 137, 1990

ABBREVIATIONS

- p paper, address or lecture
- d discussion on a paper
- a abstract of paper or address
- e errata
- s synopsis of a paper published in full in another Part of the IEE Proceedings

Author index

A

Abdel-Salam, M., and Allen, N.L. Inception of corona and rate of rise of voltage in diverging electric fields p217
Ahmed, M.T., Rehman, M., and Arif, M. see Rehman, M.
Albanese, R., and Rubinacci, G. Formulation of the eddy-current problem p16
Allen, J.E. Comparison of the practical advantages of alternative descriptions of electromagnetic momentum d155
Allen, N.L., and Abdel-Salam, M. see Abdel-Salam, M.
Arif, M., Rehman, M., and Ahmed, M.T. see Rehman, M.
Asano, K. Relaxation time of space charge in a partly filled tank p111
Auckland, D.W., Varlow, B.R., and Maloney, D. Ultrasonic detection of insulation degradation p356

B

Baldomir, D., and Hammond, P. Geometrical formulation for variational electromagnetics p321
Barber, T.J., Boardman, J.T., and Brown, N. Practical evaluation of an intelligent knowledge-based project control system p35
Belhadfa, A., Hinrichsen, P.F., Houdayer, A., Kajrys, G., Kennedy, G., St-Pierre, J., and Crine, J.-P. see Hinrichsen, P.F.
Binns, K.J., and Vourdas, A. see Vourdas, A.
Boardman, J.T., Barber, T.J., and Brown, N. see Barber, T.J.
Bond, L.J., and Clark, R. see Clark, R.
Brown, N., Barber, T.J., and Boardman, J.T. see Barber, T.J.

C

Calderwood, J.H., and Mognaschi, E.R. see Mognaschi, E.R.
Carpenter, C.J. Comparison of the practical advantages of alternative descriptions of electromagnetic momentum d155
Carpenter, C.J. Electromagnetism and semantics d157
Carter, G. Industrial experience and first degree success p228
Christopoulos, C., and Hui, S.Y.R. see Hui, S.Y.R.
Clark, R., and Bond, L.J. Response of horizontal-axis eddy-current coils to layered media: a theoretical and experimental study p141
Collins, R., and Michael, D.H. see Michael, D.H.
Constable, G.E.P. Address as Chairman of the IEE Management & Design Division: Managing product design p8
Crine, J.-P., Hinrichsen, P.F., Houdayer, A., Kajrys, G., Belhadfa, A., Kennedy, G., and St-Pierre, J. see Hinrichsen, P.F.

D

Dale, B.G. Japanese manufacturing efficiency: a study in the electronics industry p293
Dale, B.G., and McHugh, J. see McHugh, J.
Demashkieh, I., and Diab, H. see Diab, H.
Diab, H., and Demashkieh, I. A reconfigurable microprocessor teaching tool p287
Dorey, H.A. Address as Chairman of the IEE Science, Education and Technology Division: Measurement in chaos p1

E

Easterly, C.E., Griffin, G.D., Nolan, M.G., Sauers, I., and Votaw, P.C. see Griffin, G.D.

F

Fahmy, M.N.I., Hashish, E.A., and Zahran, M.M. see Hashish, E.A.
Fang, M.T.C., and Lin, W.Y. Current zero behaviour of a gas-blast arc. Part 1: Nitrogen p175
Ferrari, R.L., and Naidu, R.L. Finite-element modelling of high-frequency electromagnetic problems with material discontinuities p313
Field, Capt. J.C.G. Electromagnetism and semantics d157
Flynn, B.W. Satway: an analogue electronic circuit design teaching exercise p365
Fuentes-Rosado, J., Haddad, A., German, D.M., and Waters, R.T. see Haddad, A.

G

German, D.M., Haddad, A., Fuentes-Rosado, J., and Waters, R.T. see Haddad, A.
Gluskin, E. On the theory of fluorescent lamp circuits p201
Godfrey, R.M. Some thoughts on engineering systems development p302
Griffin, G.D., Nolan, M.G., Easterly, C.E., Sauers, I., and Votaw, P.C. Concerning biological effects of spark-decomposed SF_6 p221

H

Haddad, A., Fuentes-Rosado, J., German, D.M., and Waters, R.T. Characterisation of ZnO surge arrester elements with direct and power frequency voltages p269
Hammill, J., Sallabank, L.C.T., and Kelly, P.B. Management of large projects p55
Hammond, E.A.B. Making industry more difficult p65
Hammond, P., and Baldomir, D. see Baldomir, D.
Hara, M., and Kubucki, M. Effect of thermally induced bubbles on the electrical breakdown characteristics of liquid nitrogen p209
Hara, M., and Sumiyoshitani, S. see Sumiyoshitani, S.
Hashish, E.A., Zahran, M.M., and Fahmy, M.N.I. New method for permittivity and conductivity inversion of discrete layered earth p346
Hinrichsen, P.F., Houdayer, A., Kajrys, G., Belhadfa, A., Kennedy, G., St-Pierre, J., and Crine, J.-P. Comparison of NAA and micro-PIXE for impurity detection in water trees grown in XLPE cables p255
Horsnell, R. Role of venture capital in the UK electronics industry p361
Houdayer, A., Hinrichsen, P.F., Kajrys, G., Belhadfa, A., Kennedy, G., St-Pierre, J., and Crine, J.-P. see Hinrichsen, P.F.
Hughes, R.D. Transformation of square-wave spectral estimates to Fourier coefficients p161
Hui, S.Y.R., and Christopoulos, C. Numerical simulation of power circuits using transmission-line modelling p379

I

Ijumba, N.M.L. DC and impulse discharge characteristics in mixtures of SF_6 and Freon 113 p92

K

Kajrys, G., Hinrichsen, P.F., Houdayer, A., Belhadfa, A., Kennedy, G., St-Pierre, J., and Crine, J.-P. see Hinrichsen, P.F.
Kelly, P.B., Hammill, J., and Sallabank, L.C.T. see Hammill, J.
Kennedy, G., Hinrichsen, P.F., Houdayer, A., Kajrys, G., Belhadfa, A., St-Pierre, J., and Crine, J.-P. see Hinrichsen, P.F.
Kotiuga, P.R. Magnetostatics with scalar potentials in multiply connected regions p231
Kubucki, M., and Hara, M. see Hara, M.
Kyriakos, S., Tsiboukis, T.D., and Papagiannakis, A. see Tsiboukis, T.D.

L

Lal, M., and Parshad, R. Increased attractive forces between electrodes in an electric discharge p200
Lin, W.Y., and Fang, M.T.C. see Fang, M.T.C.
Lucas, J., Zeng, X.M., Ren, Y.Y., and Parker, A.B. see Zeng, X.M.
Lucas, J., Zeng, X.M., and Parker, A.B. see Zeng, X.M.

M

Maksiejewski, J.L. Evaluation of thermal characteristics of conductors under surge currents taking the skin effect into account p85
Maksiejewski, J.L. Losses in conductors due to current surges taking the skin effect into account p80
Maloney, D., Auckland, D.W., and Varlow, B.R. see Auckland, D.W.
McHugh, J., and Dale, B.G. Analysis of a diary of events in the life of a quality circle programme p27
McIver, M. Inversion of voltage measurements to predict crack shape p126
McNab, A., and Thomson, J. Measurement technique for eddy-current arrays p147
Michael, D.H., and Collins, R. Edge corrections for thin-skin eddy-current fields p131
Mognaschi, E.R., and Calderwood, J.H. Asynchronous dielectric induction motor p331
Moses, A.J. Electrical steels: past, present and future developments p233

N

Naidu, R.L., and Ferrari, R.L. see Ferrari, R.L.
Naidu, S.R. Simulation of the hysteresis phenomenon using Preisach's theory p73
Newborough, M., and Probert, S.D. Electromagnetic heating: an interdisciplinary activity p280
Nolan, M.G., Griffin, G.D., Easterly, C.E., Sauers, I., and Votaw, P.C. see Griffin, G.D.

O

Ongaro, R. Contribution to current transient analysis including space-charge build-up and dipolar relaxation p97

P

Papagiannakis, A., Tsiboukis, T.D., and Kyriakos, S. see Tsiboukis, T.D.
Parker, A.B., Zeng, X.M., Lucas, J., and Ren, Y.Y. see Zeng, X.M.
Parker, A.B., Zeng, X.M., and Lucas, J. see Zeng, X.M.
Parshad, R., and Lal, M. see Lal, M.
Penman, J. Eddy currents and nondestructive testing (Editorial) p125
Platt of Writtle, Baroness. Are women electrified by your Institution? p117
Probert, S.D., and Newborough, M. see Newborough, M.

R

Razek, A., and Ren, Z. see Ren, Z.
Rehman, M., Ahmed, M.T., and Arif, M. Critical study and applications of a self-balancing bridge p23
Ren, Y.Y., Zeng, X.M., Lucas, J., and Parker, A.B. see Zeng, X.M.
Ren, Z., and Razek, A. New technique for solving three-dimensional multiply connected eddy-current problems p135
Rubinacci, G., and Albanese, R. see Albanese, R.

S

Sali, S. Triaxial cable designs with optimum braided shields p165
Sallabank, L.C.T., Hammill, J., and Kelly, P.B. see Hammill, J.
Sauers, I., Griffin, G.D., Nolan, M.G., Easterly, C.E., and Votaw, P.C. see Griffin, G.D.
St-Pierre, J., Hinrichsen, P.F., Houdayer, A., Kajrys, G., Belhadfa, A., Kennedy, G., and Crine, J.-P. see Hinrichsen, P.F.
Sumiyoshitani, S., and Hara, M. Electrification of an isolated spherical object in the presence of an ion-flow field and air stream p339

T

Thompson, P.J. Creating a national system for vocational standards and qualifications p309
Thomson, J., and McNab, A. see McNab, A.
Tihanyi, L. Simple method for calculating I^2t rating p376
Tsiboukis, T.D., Kyriakos, S., and Papagiannakis, A. Use of simplex co-ordinates in dual finite-element calculations of Poissonian magnetic field problems p349

V

Varlow, B.R., Auckland, D.W., and Maloney, D. see Auckland, D.W.
Virr, L.E. Increased electric shock risk underwater due to electrode configuration and insulating boundaries p261
Votaw, P.C., Griffin, G.D., Nolan, M.G., Easterly, C.E., and Sauers, I. see Griffin, G.D.
Vourdas, A., and Binns, K.J. Magnetostatics with scalar potentials in multiply connected regions p231

W

Waters, R.T., Haddad, A., Fuentes-Rosado, J., and German, D.M. see Haddad, A.
Whittington, H.W., and Wilson, J.G. see Wilson, J.G.
Wickens, P.D. Production management: Japanese and British approaches p52
Wilson, J.G., and Whittington, H.W. Variations in the electrical properties of concrete with change in frequency p246
Woods, R.C. Contribution to the teaching of wave mechanics to students of electronic engineering p371

Z

Zahran, M.M., Hashish, E.A., and Fahmy, M.N.I. see Hashish, E.A.
Zeng, X.M., Lucas, J., Ren, Y.Y., and Parker, A.B. Welding with high-frequency square-wave AC arcs p193
Zeng, X.M., Parker, A.B., and Lucas, J. High-frequency TIG-welding power supply with microprocessor control p184

Book review

Human factors in decision making, their influence on safety and reliability. Beverley A. Sayers (Ed.) p124

Addresses

Constable, G.E.P. Address as Chairman of the IEE Management & Design Division: Managing product design p8
Dorey, H.A. Address as Chairman of the IEE Science, Education and Technology Division: Measurement in chaos p1

ARCING

Current zero behaviour of a gas-blast arc. Part 1: Nitrogen. M.T.C. Fang and W.Y. Lin p175
High-frequency TIG-welding power supply with microprocessor control. X.M. Zeng, A.B. Parker and J. Lucas p184
Increased attractive forces between electrodes in an electric discharge. M. Lal and R. Parshad p200
Welding with high-frequency square-wave AC arcs. X.M. Zeng, J. Lucas, Y.Y. Ren and A.B. Parker p193

BIOLOGICAL EFFECTS

Concerning biological effects of spark-decomposed SF_6. G.D. Griffin, M.G. Nolan, C.E. Easterly, I. Sauers and P.C. Votaw p221

BREAKDOWN AND GAS DISCHARGES

Concerning biological effects of spark-decomposed SF_6. G.D. Griffin, M.G. Nolan, C.E. Easterly, I. Sauers and P.C. Votaw p221
Contribution to current transient analysis including space-charge build-up and dipolar relaxation. R. Ongaro p97
Current zero behaviour of a gas-blast arc. Part 1: Nitrogen. M.T.C. Fang and W.Y. Lin p175
DC and impulse discharge characteristics in mixtures of SF_6 and Freon 113. N.M.L. Ijumba p92
Effect of thermally induced bubbles on the electrical breakdown characteristics of liquid nitrogen. M. Hara and M. Kubucki p209
Electrification of an isolated spherical object in the presence of an ion-flow field and air stream. S. Sumiyoshitani and M. Hara p339
Inception of corona and rate of rise of voltage in diverging electric fields. M. Abdel-Salam and N.L. Allen p217
On the theory of fluorescent lamp circuits. E. Gluskin p201
Relaxation time of space charge in a partly filled tank. K. Asano p111

CABLES AND OVERHEAD LINES

Comparison of NAA and micro-PIXE for impurity detection in water trees grown in XLPE cables. P.F. Hinrichsen, A. Houdayer, G. Kajrys, A. Belhadfa, G. Kennedy, J. St-Pierre and J.-P. Crine p255

CIRCUIT THEORY AND DESIGN

Satway: an analogue electronic circuit design teaching exercise. B.W. Flynn p365

COAXIAL CABLES

Triaxial cable designs with optimum braided shields. S. Sali p165

COMPUTER APPLICATIONS

A reconfigurable microprocessor teaching tool. H. Diab and I. Demashkieh p287

CONDUCTORS AND CONDUCTIVITY

Evaluation of thermal characteristics of conductors under surge currents taking the skin effect into account. J.L. Maksiejewski p85
Losses in conductors due to current surges taking the skin effect into account. J.L. Maksiejewski p80
New method for permittivity and conductivity inversion of discrete layered earth. E.A. Hashish, M.M. Zahran and M.N.I. Fahmy p346
Variations in the electrical properties of concrete with change in frequency. J.G. Wilson and H.W. Whittington p246

CONTROL EQUIPMENT AND APPLICATIONS

High-frequency TIG-welding power supply with microprocessor control. X.M. Zeng, A.B. Parker and J. Lucas p184

DESIGN

Some thoughts on engineering systems development. R.M. Godfrey p302

DIELECTRIC MATERIALS

Asynchronous dielectric induction motor. E.R. Mognaschi and J.H. Calderwood p331
Characterisation of ZnO surge arrester elements with direct and power frequency voltages. A. Haddad, J. Fuentes-Rosado, D.M. German and R.T. Waters p269
Relaxation time of space charge in a partly filled tank. K. Asano p111

EDDY CURRENTS

Eddy currents and nondestructive testing (Editorial). J. Penman p125
Edge corrections for thin-skin eddy-current fields. D.H. Michael and R. Collins p131
Formulation of the eddy-current problem. R. Albanese and G. Rubinacci p16
Inversion of voltage measurements to predict crack shape. M. McIver p126
Measurement technique for eddy-current arrays. A. McNab and J. Thomson p147
New technique for solving three-dimensional multiply connected eddy-current problems. Z. Ren and A. Razek p135
Response of horizontal-axis eddy-current coils to layered media: a theoretical and experimental study. R. Clark and L.J. Bond p141

EDUCATION AND TRAINING

A reconfigurable microprocessor teaching tool. H. Diab and I. Demashkieh p287
Are women electrified by your Institution?. Baroness. Platt of Writtle p117
Contribution to the teaching of wave mechanics to students of electronic engineering. R.C. Woods p371
Creating a national system for vocational standards and qualifications. P.J. Thompson p309
Electromagnetic heating: an interdisciplinary activity. M. Newborough and S.D. Probert p280
Electromagnetism and semantics. Capt. J.C.G. Field d157
Industrial experience and first degree success. G. Carter p228
Satway: an analogue electronic circuit design teaching exercise. B.W. Flynn p365

EDUCATIONAL PROJECTS

Are women electrified by your Institution?. Baroness. Platt of Writtle p117
Electromagnetic heating: an interdisciplinary activity. M. Newborough and S.D. Probert p280

ELECTRICAL MACHINES

Asynchronous dielectric induction motor. E.R. Mognaschi and J.H. Calderwood p331

ELECTROMAGNETIC THEORY

Asynchronous dielectric induction motor. E.R. Mognaschi and J.H. Calderwood p331
Comparison of the practical advantages of alternative descriptions of electromagnetic momentum. C.J. Carpenter d155
Contribution to current transient analysis including space-charge build-up and dipolar relaxation. R. Ongaro p97
Contribution to the teaching of wave mechanics to students of electronic engineering. R.C. Woods p371
Current zero behaviour of a gas-blast arc. Part 1: Nitrogen. M.T.C. Fang and W.Y. Lin p175
Eddy currents and nondestructive testing (Editorial). J. Penman p125
Edge corrections for thin-skin eddy-current fields. D.H. Michael and R. Collins p131
Effect of thermally induced bubbles on the electrical breakdown characteristics of liquid nitrogen. M. Hara and M. Kubucki p209
Electrification of an isolated spherical object in the presence of an ion-flow field and air stream. S. Sumiyoshitani and M. Hara p339
Electromagnetic heating: an interdisciplinary activity. M. Newborough and S.D. Probert p280
Electromagnetism and semantics. Capt. J.C.G. Field d157
Evaluation of thermal characteristics of conductors under surge currents taking the skin effect into account. J.L. Maksiejewski p85
Finite-element modelling of high-frequency electromagnetic problems with material discontinuities. R.L. Ferrari and R.L. Naidu p313
Formulation of the eddy-current problem. R. Albanese and G. Rubinacci p16
Geometrical formulation for variational electromagnetics. D. Baldomir and P. Hammond p321
Inception of corona and rate of rise of voltage in diverging electric fields. M. Abdel-Salam and N.L. Allen p217
Increased attractive forces between electrodes in an electric discharge. M. Lal and R. Parshad p200
Inversion of voltage measurements to predict crack shape. M. McIver p126
Losses in conductors due to current surges taking the skin effect into account. J.L. Maksiejewski p80
Magnetostatics with scalar potentials in multiply connected regions. A. Vourdas and K.J. Binns p231
Measurement technique for eddy-current arrays. A. McNab and J. Thomson p147
New method for permittivity and conductivity inversion of discrete layered earth. E.A. Hashish, M.M. Zahran and M.N.I. Fahmy p346
New technique for solving three-dimensional multiply connected eddy-current problems. Z. Ren and A. Razek p135
On the theory of fluorescent lamp circuits. E. Gluskin p201
Response of horizontal-axis eddy-current coils to layered media: a theoretical and experimental study. R. Clark and L.J. Bond p141
Triaxial cable designs with optimum braided shields. S. Sali p165
Use of simplex co-ordinates in dual finite-element calculations of Poissonian magnetic field problems. T.D. Tsiboukis, S. Kyriakos and A. Papagiannakis p349

ENGINEERING ADMINISTRATION AND MANAGEMENT

Analysis of a diary of events in the life of a quality circle programme. J. McHugh and B.G. Dale p27
Are women electrified by your Institution?. Baroness. Platt of Writtle p117
Creating a national system for vocational standards and qualifications. P.J. Thompson p309
Japanese manufacturing efficiency: a study in the electronics industry. B.G. Dale p293
Making industry more difficult. E.A.B. Hammond p65
Management of large projects. J. Hammill, L.C.T. Sallabank and P.B. Kelly p55
Practical evaluation of an intelligent knowledge-based project control system. T.J. Barber, J.T. Boardman and N. Brown p35
Production management: Japanese and British approaches. P.D. Wickens p52
Role of venture capital in the UK electronics industry. R. Horsnell p361

ENGINEERING AND SOCIETY

Are women electrified by your Institution?. Baroness. Platt of Writtle p117
Making industry more difficult. E.A.B. Hammond p65

FERRITES AND FERROMAGNETICS

Edge corrections for thin-skin eddy-current fields. D.H. Michael and R. Collins p131
Simulation of the hysteresis phenomenon using Preisach's theory. S.R. Naidu p73

FINANCIAL MANAGEMENT

Role of venture capital in the UK electronics industry. R. Horsnell p361

HAZARDS

Concerning biological effects of spark-decomposed SF_6. G.D. Griffin, M.G. Nolan, C.E. Easterly, I. Sauers and P.C. Votaw p221
Increased electric shock risk underwater due to electrode configuration and insulating boundaries. L.E. Virr p261

HYSTERESIS

Simulation of the hysteresis phenomenon using Preisach's theory. S.R. Naidu p73

INDUCTION MOTORS

Asynchronous dielectric induction motor. E.R. Mognaschi and J.H. Calderwood p331

INSTRUMENTATION AND MEASURING SCIENCE

Characterisation of ZnO surge arrester elements with direct and power frequency voltages. A. Haddad, J. Fuentes-Rosado, D.M. German and R.T. Waters p269
Comparison of NAA and micro-PIXE for impurity detection in water trees grown in XLPE cables. P.F. Hinrichsen, A. Houdayer, G. Kajrys, A. Belhadfa, G. Kennedy, J. St-Pierre and J.-P. Crine p255
Critical study and applications of a self-balancing bridge. M. Rehman, M.T. Ahmed and M. Arif p23
Inversion of voltage measurements to predict crack shape. M. McIver p126
Measurement in chaos. H.A. Dorey p1
Measurement technique for eddy-current arrays. A. McNab and J. Thomson p147
New method for permittivity and conductivity inversion of discrete layered earth. E.A. Hashish, M.M. Zahran and M.N.I. Fahmy p346
Response of horizontal-axis eddy-current coils to layered media: a theoretical and experimental study. R. Clark and L.J. Bond p141
Simple method for calculating I^2t rating. L. Tihanyi p376
Transformation of square-wave spectral estimates to Fourier coefficients. R.D. Hughes p161
Triaxial cable designs with optimum braided shields. S. Sali p165
Variations in the electrical properties of concrete with change in frequency. J.G. Wilson and H.W. Whittington p246
Welding with high-frequency square-wave AC arcs. X.M. Zeng, J. Lucas, Y.Y. Ren and A.B. Parker p193

INSULATORS AND INSULATION

Concerning biological effects of spark-decomposed SF_6. G.D. Griffin, M.G. Nolan, C.E. Easterly, I. Sauers and P.C. Votaw p221
Triaxial cable designs with optimum braided shields. S. Sali p165
Ultrasonic detection of insulation degradation. D.W. Auckland, B.R. Varlow and D. Maloney p356

LONG-TERM PLANNING

Japanese manufacturing efficiency: a study in the electronics industry. B.G. Dale p293

MAGNETIC DEVICES AND PROPERTIES

Effect of thermally induced bubbles on the electrical breakdown characteristics of liquid nitrogen. M. Hara and M. Kubucki p209

MAGNETIC FIELDS

Comparison of the practical advantages of alternative descriptions of electromagnetic momentum. C.J. Carpenter d155
Contribution to current transient analysis including space-charge build-up and dipolar relaxation. R. Ongaro p97
Magnetostatics with scalar potentials in multiply connected regions. A. Vourdas and K.J. Binns p231
Simulation of the hysteresis phenomenon using Preisach's theory. S.R. Naidu p73
Use of simplex co-ordinates in dual finite-element calculations of Poissonian magnetic field problems. T.D. Tsiboukis, S. Kyriakos and A. Papagiannakis p349

MANAGEMENT

Creating a national system for vocational standards and qualifications. P.J. Thompson p309
Japanese manufacturing efficiency: a study in the electronics industry. B.G. Dale p293
Making industry more difficult. E.A.B. Hammond p65
Management of large projects. J. Hammill, L.C.T. Sallabank and P.B. Kelly p55
Managing product design. G.E.P. Constable p8
Producuion management: Japanese and British approaches. P.D. Wickens p52
Role of venture capital in the UK electronics industry. R. Horsnell p361
Some thoughts on engineering systems development. R.M. Godfrey p302

MANUFACTURING

Electrical steels: past, present and future developments. A.J. Moses p233
Japanese manufacturing efficiency: a study in the electronics industry. B.G. Dale p293

MATHEMATICAL TECHNIQUES

Comparison of the practical advantages of alternative descriptions of electromagnetic momentum. C.J. Carpenter d155
Evaluation of thermal characteristics of conductors under surge currents taking the skin effect into account. J.L. Maksiejewski p85
Formulation of the eddy-current problem. R. Albanese and G. Rubinacci p16
Losses in conductors due to current surges taking the skin effect into account. J.L. Maksiejewski p80
Magnetostatics with scalar potentials in multiply connected regions. A. Vourdas and K.J. Binns p231
New technique for solving three-dimensional multiply connected eddy-current problems. Z. Ren and A. Razek p135
Simulation of the hysteresis phenomenon using Preisach's theory. S.R. Naidu p73
Transformation of square-wave spectral estimates to Fourier coefficients. R.D. Hughes p161
Use of simplex co-ordinates in dual finite-element calculations of Poissonian magnetic field problems. T.D. Tsiboukis, S. Kyriakos and A. Papagiannakis p349

MICROPROCESSORS

A reconfigurable microprocessor teaching tool. H. Diab and I. Demashkieh p287
High-frequency TIG-welding power supply with microprocessor control. X.M. Zeng, A.B. Parker and J. Lucas p184

NONDESTRUCTIVE TESTING

Eddy currents and nondestructive testing (Editorial). J. Penman p125
Edge corrections for thin-skin eddy-current fields. D.H. Michael and R. Collins p131

NUMERICAL ANALYSIS

Magnetostatics with scalar potentials in multiply connected regions. A. Vourdas and K.J. Binns p231
Numerical simulation of power circuits using transmission-line modelling. S.Y.R. Hui and C. Christopoulos p379

PERMITTIVITY

New method for permittivity and conductivity inversion of discrete layered earth. E.A. Hashish, M.M. Zahran and M.N.I. Fahmy p346

PHYSICAL PROPERTIES

Characterisation of ZnO surge arrester elements with direct and power frequency voltages. A. Haddad, J. Fuentes-Rosado, D.M. German and R.T. Waters p269
Comparison of NAA and micro-PIXE for impurity detection in water trees grown in XLPE cables. P.F. Hinrichsen, A. Houdayer, G. Kajrys, A. Belhadfa, G. Kennedy, J. St-Pierre and J.-P. Crine p255
Critical study and applications of a self-balancing bridge. M. Rehman, M.T. Ahmed and M. Arif p23
Electrical steels: past, present and future developments. A.J. Moses p233
Variations in the electrical properties of concrete with change in frequency. J.G. Wilson and H.W. Whittington p246

POWER TRANSMISSION AND DISTRIBUTION

Characterisation of ZnO surge arrester elements with direct and power frequency voltages. A. Haddad, J. Fuentes-Rosado, D.M. German and R.T. Waters p269

POWER UTILISATION AND INDUSTRIAL APPLICATIONS

Electrical steels: past, present and future developments. A.J. Moses p233

PRODUCT DESIGN

Managing product design. G.E.P. Constable p8
Some thoughts on engineering systems development. R.M. Godfrey p302

PROJECT AND PRODUCTION ENGINEERING

Analysis of a diary of events in the life of a quality circle programme. J. McHugh and B.G. Dale p27
Management of large projects. J. Hammill, L.C.T. Sallabank and P.B. Kelly p55
Production management: Japanese and British approaches. P.D. Wickens p52
Role of venture capital in the UK electronics industry. R. Horsnell p361
Some thoughts on engineering systems development. R.M. Godfrey p302

PROJECT MANAGEMENT

Management of large projects. J. Hammill, L.C.T. Sallabank and P.B. Kelly p55
Practical evaluation of an intelligent knowledge-based project control system. T.J. Barber, J.T. Boardman and N. Brown p35

REVIEWS OF PROGRESS

Electrical steels: past, present and future developments. A.J. Moses p233

SIGNAL PROCESSING

Transformation of square-wave spectral estimates to Fourier coefficients. R.D. Hughes p161

SIMULATION

Numerical simulation of power circuits using transmission-line modelling. S.Y.R. Hui and C. Christopoulos p379
Practical evaluation of an intelligent knowledge-based project control system. T.J. Barber, J.T. Boardman and N. Brown p35

SONICS AND ULTRASONICS

Ultrasonic detection of insulation degradation. D.W. Auckland, B.R. Varlow and D. Maloney p356

STANDARDISATION AND STANDARDS

Creating a national system for vocational standards and qualifications. P.J. Thompson p309

SYSTEM PROTECTION

Simple method for calculating I^2t rating. L. Tihanyi p376

TRANSMISSION LINES

Numerical simulation of power circuits using transmission-line modelling. S.Y.R. Hui and C. Christopoulos p379